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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/525,677	02/18/2005	Tsuneo Takano	20295/0202527-US0	9525

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EXAMINER	
YI, STELLA KIM	

ART UNIT	PAPER NUMBER
1791	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/525,677	TAKANO ET AL.	
	Examiner	Art Unit	
	Stella Yi	1791	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *23 March 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1, 7-21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,7-21* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on March 23, 2009 has been entered.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1, 7-11, and 15-21, are rejected under 35 U.S.C. 103(a) as being unpatentable over LI et al. (5,112,667) in view of DENOMMEE et al. (3,956,447).

Regarding claims 1, 3, and 9, LI et al. discloses a method of producing a helmet (molded article) of a unidirectional (continuous single direction) fiber-reinforced composite material by simultaneously molding a plurality of sheets of prepreg cut out in a predetermined shape (Col.4, lines 9-15 and Abstract), the method characterized by including the steps of:

(1) the said helmet uses a plurality of prepreg layers cut into patterns (22-Figs.7 and 8) (Col.3, lines 34-39) that has a continuous plurality of notches or cutouts from a center portion to outer circumference (see 26-Fig.8) in respective prepregs so as to form at least one set of partially separated flap and a residual portion (30-Fig.7) for each prepreg; and

(2) the patterns of the said prepreg layers contain cuts which enable the pattern to take a three-dimensional shape and have the cut portions having edges which substantially close up to form seams when formed into a shell using compression type molding or stamping mold (Col.3, lines 39-43; Col.4, lines 9-15) (forming a desired three-dimensional shape by pressing the partially separated flaps of the respective prepregs).

LI et al. is silent to arranging the prepregs at predetermined portions of a press die using partially separated flaps of the prepregs as positioning pieces. However, LI et al. discloses that a plurality of patterns of said prepreg layers can be “laid-up”, that is placed upon one another and placed into a compression type mold (press mold) (Col.4, lines 9-13). It would have been obvious to one of ordinary skill in the art to have arranged the prepregs on a press die using any type of positioning methods as long as the prepregs are positioned on the press mold to achieve the desired structure of the molded article. In addition, Figure 3 shows prepregs molded into the shell 12. It is inherent to position the separated flaps over the press mold to obtain the shape of the said shell 12.

LI et al. does not explicitly disclose laminating the said prepregs. However, DENOMEE et al. discloses a method of making deep drawn, laminated, non-metallic articles having high ballistic-resistance, and more particularly deep drawn, laminated, non-metallic, ballistic-resistant helmets (Col.1, lines 11-14). DENOMEE et al. discloses that it is desirable to superimpose one or more lamina of the prepeg and cut to a suitable outlined shape such as the said star-shaped pattern that comprises arms or flaps (Col.5, lines 63-68; Col.6, lines 1-6). It would have been obvious to one of ordinary skill in the art to have modified the method of producing the helmet of LI et al. to include laminating the prepreg layers as disclosed by DENOMMEE et al. in order to produce a smooth edged and high ballistic resistant helmet as taught by DENOMME et al. (Col.2, lines 11-18).

LI et al. is silent to overlapping end edge parts of residual portions (30-Fig.7) on the partially separated flaps and pressing them. However, DENOMMEE et al. discloses a method of making ballistic-resistant helmet where the arms of a star-shaped prepreg pattern are rotated in successive layers of the patterns so that partial overlapping occurs and that the spaces cut out between the arms of the star-shaped patterns are covered by portions of succeeding superimposed layers and that the effective number of layers of fabric in the final molded article will be somewhat greater in the areas near the perimeter of the stack of superimposed patterns as well as in the area near the perimeter of the preform produced therefrom (Col.2, lines 57-67) and then placing the superimposed patterns on a compression mold (Col.9, lines 24-25). It would have been obvious to one of ordinary skill in the art to have modified the method of producing the

helmet of LI et al. to include overlapping the arms or flaps of a star-shaped pattern of prepreg layers as disclosed by DENOMMEE et al. in order to produce a smooth edged and high ballistic resistant helmet (Col.2, lines 11-18).

LI et al. is silent to two pressing steps. However, DENOMMEE et al. discloses a two-step compression molding procedure (Col.4, lines 56-69). It would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the method of producing a helmet (molded article) of a fiber-reinforced composite material of LI et al. to include a second compression molding step as taught by DENOMMEE et al. in order to remove substantially all gases from a preform during the first stage of the finish molding, the degassing avoids the formation of trapped pockets of gas in the final molded article with resulting weaknesses in the article (Col.4, lines 68 through Col.5, lines 1-2).

Modified LI et al. is silent to the cut edges in the center side of the notches or cutouts being spaced at a distance of 2 mm or longer from one another. However, SAKAI et al. discloses a process for producing fiber-reinforced thermoplastic article and teaches a method on stacking the notched prepregs. SAKAI et al. teach on stacking the notched prepreg, the direction of the fiber can be properly selected according to the properties required for the molded article of FRTP. For example, molded articles of FRTP having isotropic strengths in the horizontal direction are prepared by stacking the prepregs in a manner such that the direction of the fiber in each prepreg is respectively shifted, for example, by 45 degrees to disperse the direction (Col.5, lines 65-68 through Col.6, lines 1-4). SAKAI et al. teach that desired plies of the notched prepreg are

stacked. It is more effective to stack the prepreg so that overlapping of the notches is avoided on each mutually contacting prepreg. For example, each layer gradually rotates in every direction such as clockwise or counterclockwise by a definite angle in the stacking (Col.6, lines 58-63). LI et al. discloses that the preferred prepreg layer is preferably stacked in a zero/90 degree sequence and that adjacent layers of adjacent packets will have a different angle than the angle between fibers in adjacent layers within a packet (Col.10, lines 29-34). Furthermore, LI et al. discloses that the strength of the composite depends upon the materials used and the amount of protection needed, and that this balance can be optimized with routine experimentation (Col.10, lines 39-42). It would have been obvious to one of ordinary skill in the art to stack the prepregs of LI et al. wherein each layer is laid upon the other in a certain angle to strengthen the quality of the article as taught by SAKAI et al. (Col.6, lines 1-10) in order to strengthen the quality of the helmet of LI et al.

Regarding claim 7, LI et al. discloses the width of the partially separated flaps formed by the notches or cutouts is made to be parallel toward the outer circumference (See Figure 7 and 8).

Regarding claim 8, LI et al. discloses that reinforcing fiber to be employed for the prepreg can be carbon fiber (Col.4, line 59).

Regarding claims 10, 11, 15, and 16 LI et al. discloses matrix resin to be employed for the prepreg is a thermosetting resin such as an epoxy resin (Col.9, lines 25-32).

Regarding claims 17-18, and 21, LI et al. discloses heating and pressurizing the molded article (Col.9, lines 49-55).

Regarding claims 19-20, LI et al. discloses compression molding is carried out at molding pressures of 30 to 90 tons and molding time in 15 minutes to 90 minutes and a molding temperature of 80 to 130 degree Celsius (Col.4, lines 19-21).

4. Claims 12-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over LI et al. (5,112,667) and DENOMMEE et al. (3,956,447) as applied to claims 1, 7-11 and 15-21, and in further view of AMERONGEN (3,547,764).

The teachings of LI et al. and DENOMMEE et al. are applied as described above for claims 1, 7-11 and 15-21.

Regarding claim 12, LI et al. does not explicitly disclose an epoxy resin comprising components A, B, C, and D. However, AMERONGEN discloses an epoxy resin comprising an epoxy resin (Col.3, lines 65-66), amine compounds comprising sulfur atoms (Col.4, lines 15-18), a urea compound (Col.6, line 27), and a dicyanodiamide (Col.8, line 9). It would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the epoxy resin of LI et al. to include the epoxy resin of AMERONGEN comprising an epoxy resin, sulfur amine compound, urea component, and dicyanodiamide for a fibrous material to be eligible for reinforcing purposes in which there is retention of strength under load and moisture resistance (AMERONGEN - Col.1, lines 27-34).

Regarding claim 13, AMERONGEN discloses the contents of sulfur atom are 0.1 part to 10 parts per 100 part (by weight) of rubber containing epoxy (Col.4, lines 19-22) and a urea content of 2-10% by weight (Col.6, lines 30-31).

5. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over LI et al. (5,112,667), DENOMMEE et al. (3,956,447), and AMERONGEN (3,547,764) as applied to claims 1, 7-13 and 15-21, and in further view of LAMMECK et al. (5,879,608).

The teachings of LI et al., DENOMMEE et al., and AMERONGEN are applied as described above for claims 1, 7-13 and 15-21.

Regarding claim 14, AMERONGEN is silent to the said urea being of a granular material with 150 m or smaller average particle diameter. However, LAMMECK et al. discloses a molded article containing fiber-reinforce plastic material comprising epoxy resins (Col.2, line 21) and granular urea component of particle size 8 mm (Col.5, line 65), which is less than 150 μm. It would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the urea component of AMERONGEN to be a granular urea component of particle size of less than 150 m as taught by LAMMECK et al. in order to produce high-quality structural molded articles (Col.1, lines 40-42).

Response to Arguments

1. Applicant's arguments filed September 19, 2008 have been fully considered but they are not persuasive.

Applicant Argues:

a) Denommee does not disclose a two-step compression molding process, but instead discloses two stages of degassing that occur in a compression molding procedure.

b) In Sakai, the notch to notch spacing at a distance of 2-30 mm refers to adjacent notches formed on the same prepreg and provides no information as to what distance might be suitable between notches when a plurality of prepregs is used.

c) Sakai fails to disclose or suggest a method that uses continuous notches or cutouts formed from a center portion to outer circumference in respective prepregs.

Examiner respectfully disagrees with the Applicant's above arguments and would like to point out the reason(s) as discussed in the rejection:

a) The degassing step happens in one stage. Denommee teach that the degassing step occurs during the first stage of compression molding procedure. After the degassing step, the mold pressure is reapplied and increased sufficiently to complete the compression molding during the second/final stage of compression molding procedure (Col.4, lines 55-68). Denommee discloses an example of this two-step compression molding in Col.7, lines 1-15.

b) Modified LI et al. is silent to the cut edges in the center side of the notches or cutouts being spaced at a distance of 2 mm or longer from one another. However,

SAKAI et al. discloses a process for producing fiber-reinforced thermoplastic article and teaches a method on stacking the notched prepregs. SAKAI et al. teach on stacking the notched prepreg, the direction of the fiber can be properly selected according to the properties required for the molded article of FRTP. For example, molded articles of FRTP having isotropic strengths in the horizontal direction are prepared by stacking the prepregs in a manner such that the direction of the fiber in each prepreg is respectively shifted, for example, by 45 degrees to disperse the direction (Col.5, lines 65-68 through Col.6, lines 1-4). SAKAI et al. teach that desired plies of the notched prepreg are stacked. It is more effective to stack the prepreg so that overlapping of the notches is avoided on each mutually contacting prepreg. For example, each layer gradually rotates in every direction such as clockwise or counterclockwise by a definite angle in the stacking (Col.6, lines 58-63). LI et al. discloses that the preferred prepreg layer is preferably stacked in a zero/90 degree sequence and that adjacent layers of adjacent packets will have a different angle than the angle between fibers in adjacent layers within a packet (Col.10, lines 29-34). Furthermore, LI et al. discloses that the strength of the composite depends upon the materials used and the amount of protection needed, and that this balance can be optimized with routine experimentation (Col.10, lines 39-42). It would have been obvious to one of ordinary skill in the art to stack the prepregs of LI et al. wherein each layer is laid upon the other in a certain angle to strengthen the quality of the article as taught by SAKAI et al. (Col.6, lines 1-10) in order to strengthen the quality of the helmet of LI et al.

c) Sakai discloses that the prepreg is continuously notched (Col.5, lines 18-19).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stella Yi whose telephone number is 571-270-5123. The examiner can normally be reached on Monday - Thursday from 8:00 AM to 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Christina Johnson can be reached on 571-272-1176. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

SY

/Christina Johnson/

Supervisory Patent Examiner, Art Unit 1791